Concrete

Monthly Magazine of the Construction Field

Feb.

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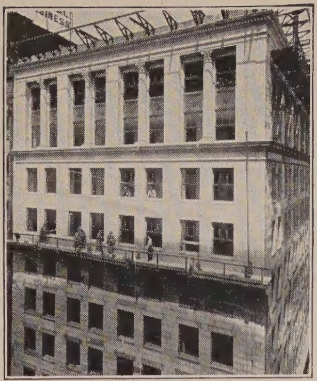

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CONCRETE, February, 1925. Vol. 26. No. 2. Published monthly by Concrete-Cement Age Pub. Co., Detroit, Mich., $2.50 per year 25c a copy. Entered as Second Class Matter at the Detroit Post Office.

Cement MILL SECTION of

Concrete

Vol. 26 JANUARY, 1925 No. 1

Superior Company Developing Plant

New Aerial Transmission to Have Hourly Capacity of 200 Tons

By Paul Gooding

In pursuance of the progressive policy that has characterized its management since the company's organization, the Superiod Portland Cement Co., whose extensive plant is located at Concrete, Wash., on the Great Northern Railway, is engaged in developing plans that will make this property one of the outstanding cement factories of the United States. Year by year it has made improvements designed to bring the plant to the highest state of efficiency and its product to the highest attainable quality. About a year ago it completed a clinker storage structure,[1] with a capacity of 125,000 bbls. and built a new machine shop and a warehouse. More recently it has made important improvements in its quarry and has built a rock storage with a capacity of 60,000 tons.

Now the company is engaged in building an aerial tramway 6,700 ft. long. The tramway is not so much the outgrowth of

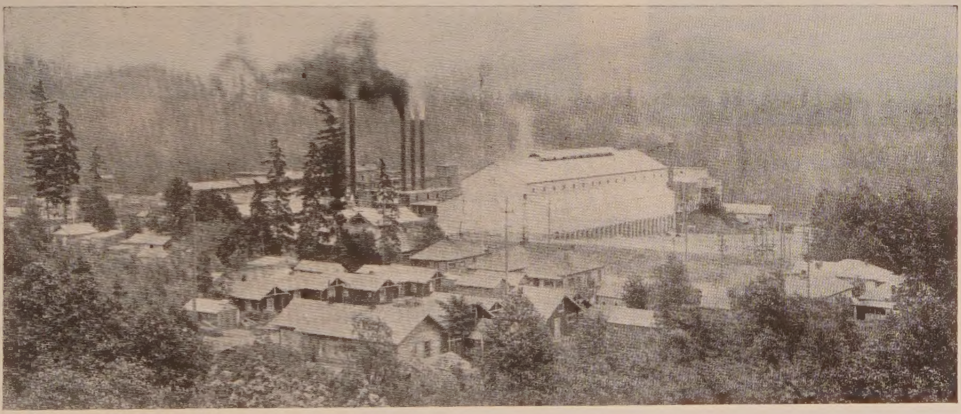

Fig. 1—General view of Superior Portland Cement Company's factory. The building in the center is the clinker storage. At the right is the coal storage pile just in front of the finish cement silos. At the left are the five kiln stacks. The houses shown in the foreground are those of mill employes. In the back ground are the foothills of the Skagit Valley

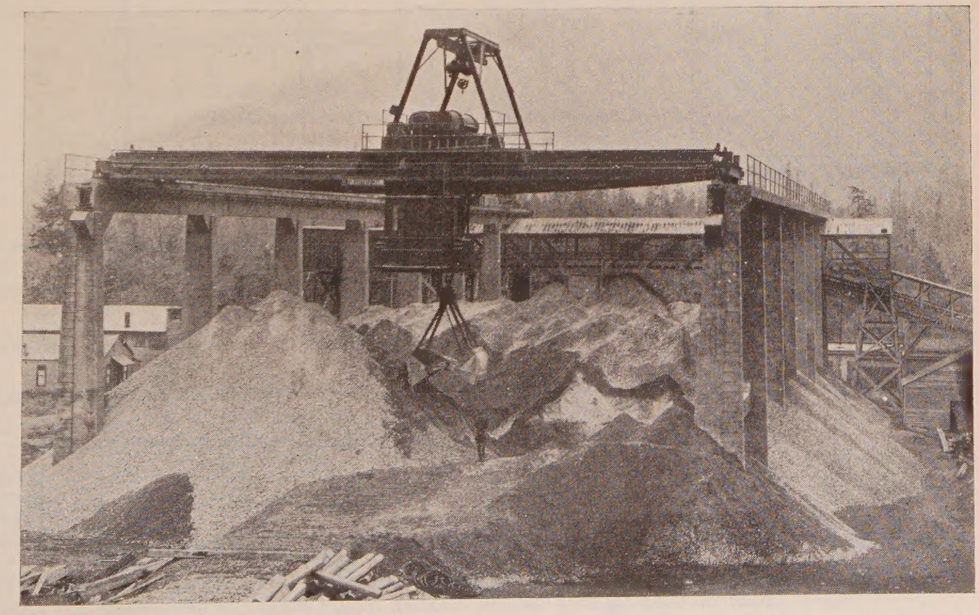

Fig. 2—General view rock storage structure

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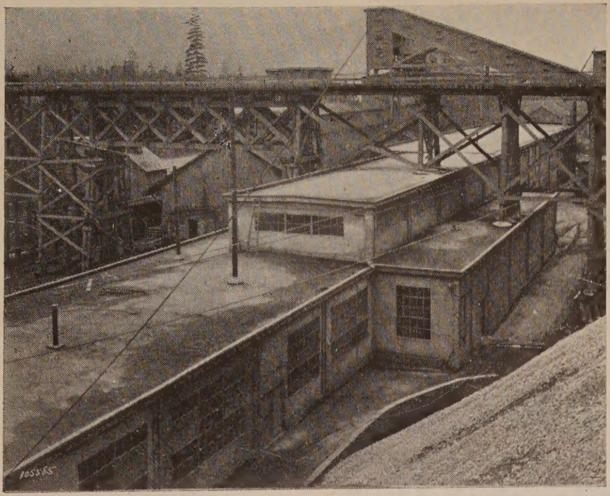
[1] See Cement Mill Section, CONCRETE, April, 1923.



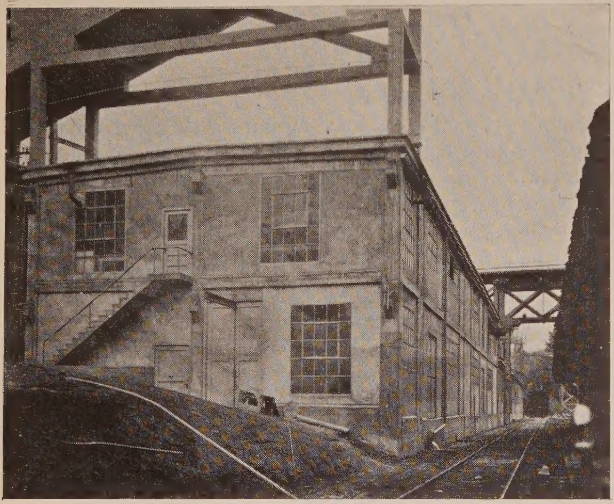
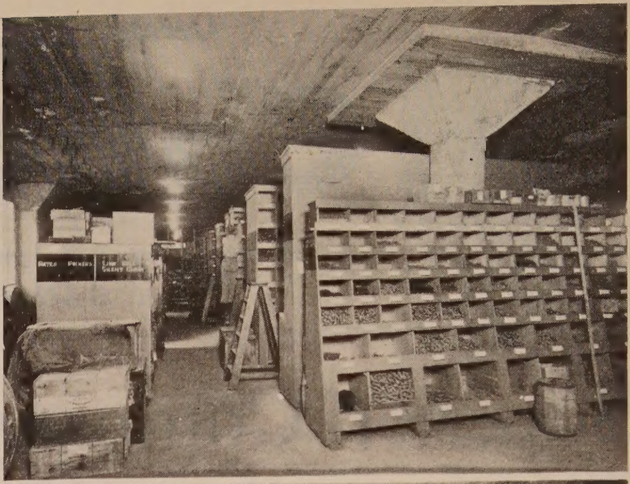


Fig. 3—Reinforced concrete shops and warehouse
Fig. 4—West elevation



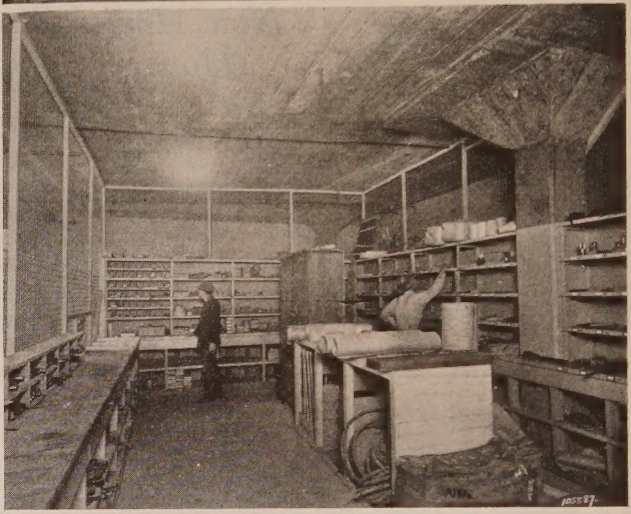


Fig. 5—Interior view of warehouse showing bins for small parts
Fig. 6—Interior view of tool room

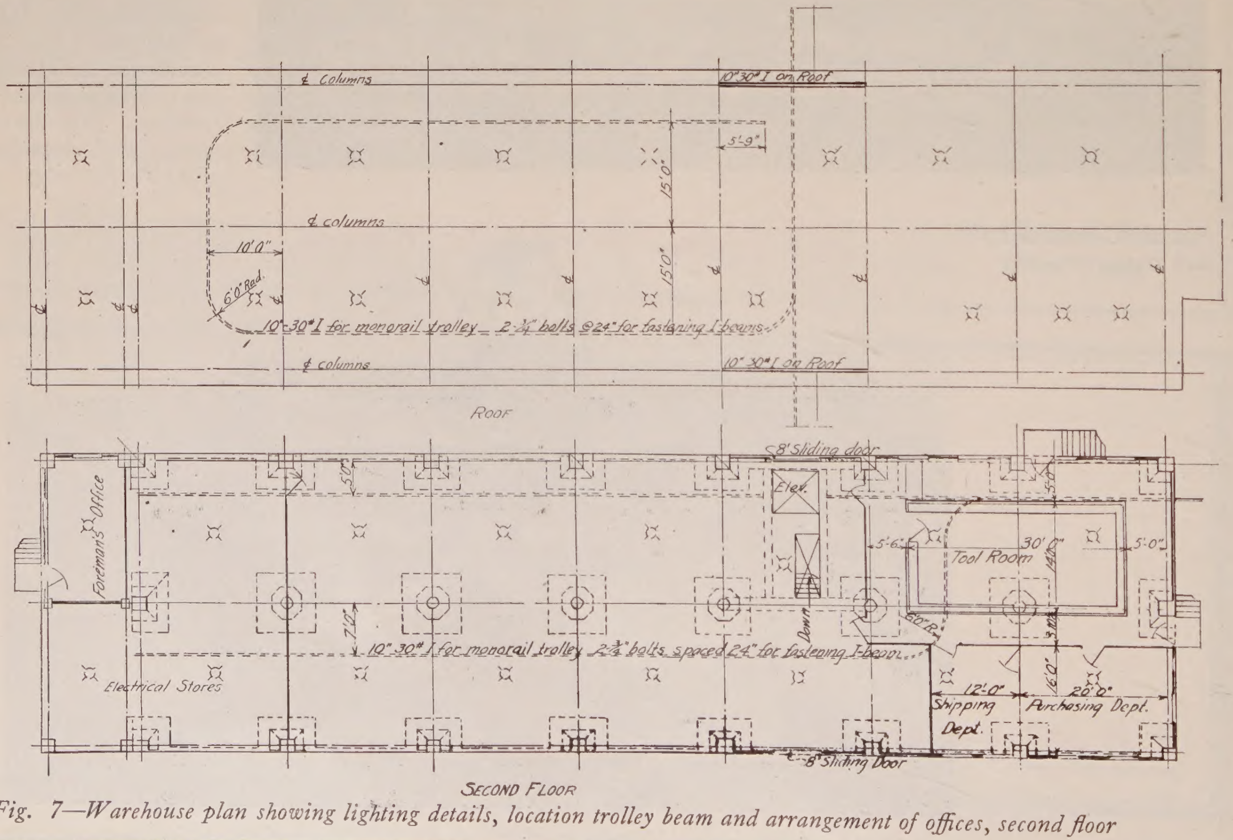
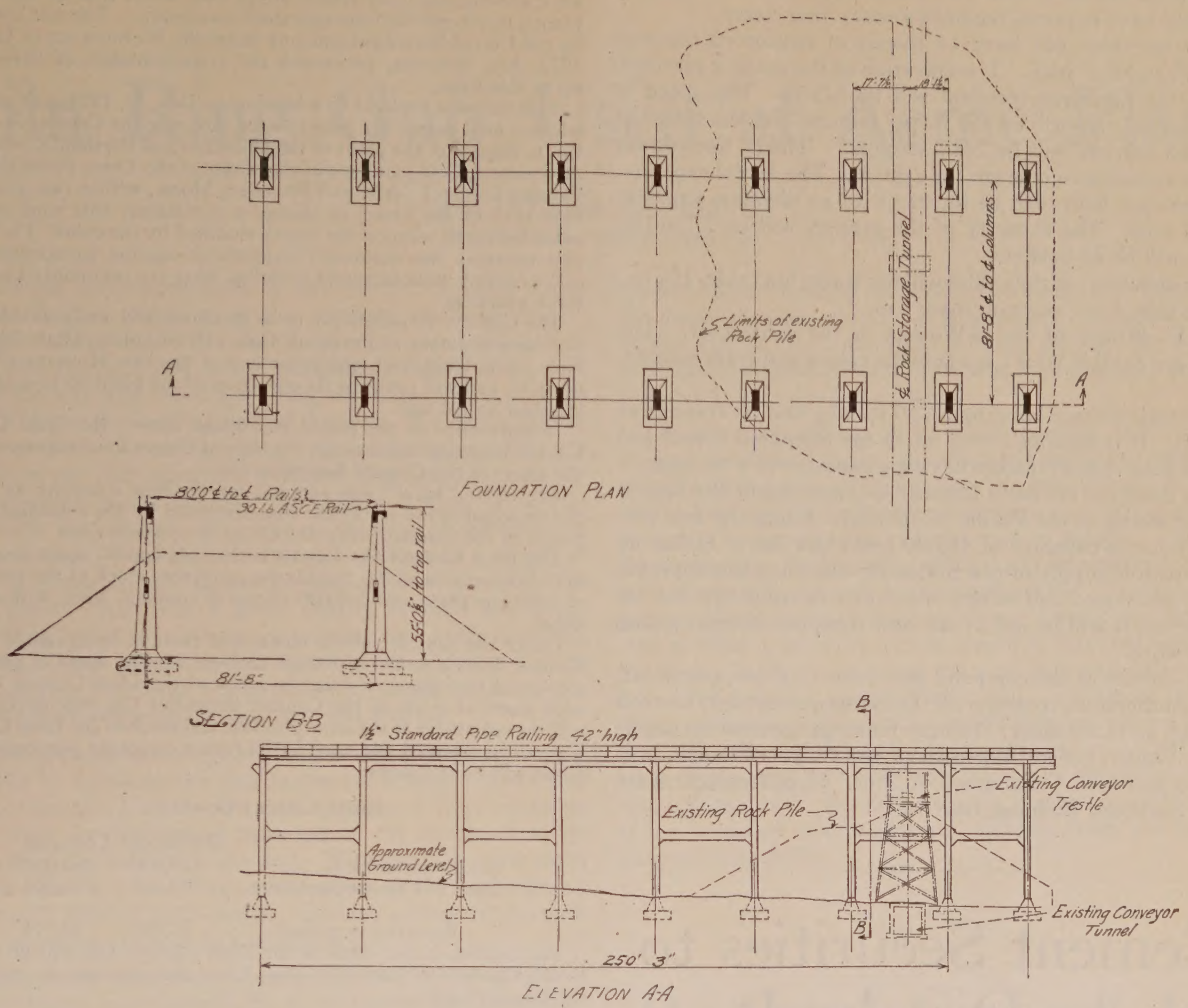


Fig. 7—Warehouse plan showing lighting details, location trolley beam and arrangement of offices, second floor



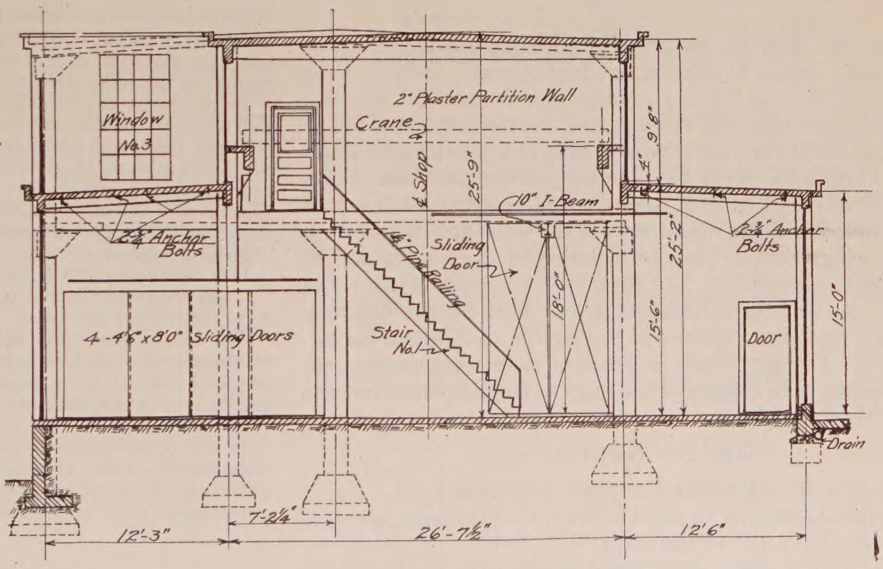


Fig. 8 (Upper)—Foundation plan, elevation and section, rock storage structure

Fig. 9 (Right) Section through machine shop showing type of construction

a progressive policy as of a necessity that arose when the Puget Sound Power & Light Co., a Stone & Webster holding, began work on a $6,000,000 power project on the Baker River, a tributary of the Skagit River, at Concrete. But, once the necessity was faced, the company characteristically laid plans to build the best tramway obtainable.

The tramway, running from the quarry to the cement works, will replace a railroad, which will be covered under many feet of water when the power dam has been completed and the river has backed up to its new level for seven or eight miles. Work on the aerial system was begun in August, 1924, and it is estimated by general superintendent C. L. Wagner that it will be completed by May 1, 1925.

The new line will be the largest aerial tramway in the Pacific Northwest, with an hourly capacity of 200 tons. The towers will be built of reinforced concrete, the company choosing this form of construction in preference to structural steel because of its lower maintenance cost. In the basic costs there was a difference of only $800 between the two materials as revealed by the bids, steel being that much cheaper. The upkeep on the steel, however, would have been heavy, since it would have required repainting every four years.

The tramway will have 14 towers of reinforced concrete from 20 to 96 ft. high. The elevation of the loading platform above the discharge terminal will be 215 ft. The speed of the traction rope will be 450 ft. per minute, and the intervals between carriers will be 24½ seconds. Thirty horsepower will be required to operate the system. The initial capacity, 200 tons per hour, can be increased to an ultimate capacity of 250 tons. The capacity of the carriers will be 2,730 lbs. There will be 88 buckets.

The diameters of the cables will be: track, load side, 1⅝ in.; empty side, 1 in.; traction rope, 1 in.

H. E. Wilder of Sedro-Woolley is the contractor. The American Steel & Wire Co. made the cables and tram machinery.

The rock storage building is 250 ft. long and its crane span is 80 ft. It is equipped with an 11-ton Shepherd crane[2] and with a Blaw-Knox[3] bucket having a capacity of 4 cu. yds.

The Superior Portland Cement Co. has one of the largest cement works in the Pacific Northwest. Using the wet process, it has a capacity of 16,000 sacks per day. It has an inexhaustible supply of raw materials and when the improvements mentioned and others under way or contemplated are completed, it will be one of the best equipped cement plants in the world.

The officers of the company are: John C. Eden, president; A. A. Sutherland, treasurer; S. L. Barnes, secretary; Gordon Tongue, sales manager; William Jennings, general manager; C. L. Wagner, general superintendent; W. J. O'Connell, purchasing agent; G. A. Campbell, auditor. Its general offices are in the Seaboard Building, Seattle.

Cement Securities to be Dissolved

Judge T. Blake Kennedy of the Federal district court of Wyoming, sitting in the Denver district court, finds that the Cement Securities Co. is a combination in unlawful restraint of interstate trade and commerce in portland cement, and is in violation of the anti-trust act. He charges that the Colorado Portland Cement Co., the Union Portland Cement Co., the Three Forks, United States, and the Nebraska Portland Cement Companies, subsidiaries of the Cement Securities Co. with being confederated in violation of the Sherman anti-trust law, and orders that they be forever dissolved. The decree is the final outcome of a suit filed by the Attorney General some three years ago to dissolve the Cement Securities Co. The gist of the decision is to instruct the Cement Securities Co. to dispose of one of its Colorado plants and one of its Montana plants.

The New Company

The new Ideal Cement Co. which will replace the Cement Securities Co. will erect a plant north of Fort Collins, Colorado, the natural gas field of the state.

In a letter to the stockholders, President Charles Boettcher of the Cement Securities Co. states:

The Cement Securities Co. heretofore has carried on its operations through the ownership or control of the capital stock of several subsidiary corporations, which in turn have owned and operated the cement plants, the Cement Securities Co. being organized exclusively as a holding company, and not for the purpose of directly owning or operating such plants.

Some months ago the officers and directors of the Cement Securities Co. reached the conclusion that it was advisable to eliminate the holding company and the various subsidiary companies, through which it has heretofore carried on its operations, and to organize an operating company which would own direct title to the cement plants, now controlled through stock ownership. The suit instituted by the United States government under the Sherman act in January, 1922, has, however, prevented the consummation of these plans up to this time.

This suit was brought to a hearing on Dec. 13, 1924, as a result of which a final decree has been entered directing the Cement Securities Co. to dispose of the plant of the United States Portland Cement Co. at Concrete, Colo., and one of the plants of the Three Forks Portland Cement Co. at Trident and Hanover, Mont., within two years; except that in the event of change in conditions this time may be extended or the terms of the decree modified by tne court. The decree also contains the customary injunctions against agreements with other cement manufacturers covering what are commonly known as trade practices.

The Cement Securities Co. or its successor, will retain its interest in the cement plants at Portland, Colo.; Devil's Slide, Utah; Superior, Neb.; Ada, Okla, and whichever one of the two Montana plants is not sold, and will continue its operation of the plant to be sold pending their actual sale.

In pursuance of the policy mentioned above, the Ideal Cement Co. has been organized under the laws of Colorado to take over all of the assets of the Cement Securities Co.

The name "Ideal" was adopted for the new company as this is the principal brand of cement manufactured by the subsidiary companies of the Cement Securities Co. at the present time.

The Ideal Cement Co. has an authorized capital stock consisting of 125,000 shares of 7% cumulative, preferred stock of the par value of $100 per share and 250,000 shares of common stock without par value.

Under the contract above mentioned there is being issued to the Cement Securities Co. of record on Dec. 22, one share of preferred stock and two shares of common stock of the Ideal Cement Co. for each share of stock of the Cement Securities Co. now outstanding and the remainder of the authorized capital stock of the Ideal Cement Co. will be retained and used for its future corporate purposes. The result will be as follows:

Ideal Cement Company

	Preferred	Common
Shares authorized	125,000	250,000
Issue to Cement Securities	97,103	194,206
Reserved in treasury	27,897	55,794

The certificates for stock in the Ideal Cement Co. will be mailed to stockholders as soon after Dec. 22 as the same can be issued by the transfer agent.

New Dividend Rate

The board of directors of the Ideal Cement Co. has also declared an initial dividend of $1.75 per share on its preferred stock and 75 cents per share on its common stock, payable Jan. 2, 1925, to stockholders of record at the close of business Dec. 22, 1924.

In the event any stockholder desires to preserve the identity of different lots of Cement Securities company stock purchased at different times and prices (in order to compute income tax liability on future sales of Ideal Cement Co. stock taking place at different times) he may return the original stock certificates of the Ideal Cement Co. issued to him and the Denver National bank, transfer agent, will split up and reissue the same in such denominations as may be desired in order to retain such identity.

It is the opinion of the board of directors of the Cement Securities Co. and the Ideal Cement Co. that this reorganization will result in more economical operation.

The Ideal Cement Co. will continue under the same policies and management as the Cement Securities Co. and will expand its business and construct new plants whenever and wherever business conditions and the requirements of any particular locality warrant such course of action.

In this connection it has already been determined to construct in northern Colorado a cement plant thoroughly modern in every particular, the plans for which are now in course of preparation, and construction work will be started early in 1925.

New Cement Firm for Michigan

An announcement has been made in Boyne City, Mich., of the organization of the Boyne City Portland Cement Co. with an authorized capitalization of $2,000,000. Directors of the company are: W. H. White, L. W. Siegel, W. L. Martin, of Boyne City; W. J. Pearson, Boyne Falls; John Yuill, Vanderbilt. Officers are: W. H. White, president; L. W. Siegel, secretary-treasurer; F. B. Gerard, general manager and chief engineer.

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[2] Shepard Electric Crane and Hoist Co., Montour Falls, N. Y.

[3] Blaw-Knox Co. Hoboken, N J.

Kiln Ring Gun Used at Acme Plant

By William H. Baker
President Acme Cement Corporation

Operating superintendents in the cement industry know without further explanation the meaning of "kiln rings." In a plant operating on the wet process there are two kinds of rings—one the mud ring, which ocassionally forms in the feed end of the kiln and the other a ring which builds up from 20 to 40 ft. from the burning end of the kiln. A cement kiln in operation carries a coating of fused clinker for quite a distance back from the burning end. A clinker ring is simply a heavy coating which builds up from the sides in a ring formation, decreasing the effective diameter of the kiln at the point of the formation. The number of rings that form in a month in a kiln depends largely upon the raw material composition. Some plants experience a great deal of trouble and delay due to ring formation; others are comparatively free from this trouble. Plants operating on the wet process, due to a more even composition, have less trouble with rings, but even wet process plants occasionally run into this trouble.

At the present time rings are broken down in several ways; generally by breaking the ring at one point with a heavy bar or jet of water. Usually when an opening or "key" is made in the ring an experienced man can in the course of a few hours, drop the balance of the ring. Therefore, for some years cement operators have felt that if a gun could be produced that would quickly and cheaply cut into clinker rings, such a gun would be of value in the industry.

Experiments have been conducted at the plant of the Acme Cement Corp. near Catskill, N. Y. by George H. Garrison of the Remington Arms Co., Inc., who has worked for about two years on the development of a gun that would be suitable for this work.[1] Various guns have been used; guns which used heavy slugs, high powered rifles and even machine guns. The high powered rifle and the machine gun were purely experimental, as the hazard from the bullets of these two types of guns was considered too great for plant use. Therefore, during the last year Mr. Garrison has concentrated his efforts on the type using a heavy slug; and the perfected gun is of bolt action type, 1-in. bore, of heavy construction. It is mounted on a platform adjustable for elevation and alignment in a very simple manner with a recoil absorbing spring, all self-contained. Each kiln front is equipped with an I-beam on the hood, which remains permanently in place. This I-beam is built for taking the mounting of the gun platform and the gun can be set in position ready for firing in less than a minute. The gun is fired through the opening in the hood. It is capable of operation at the rate of 10 to 20 shots per minute. A 3-oz. single slug is fired with a substantial charge of powder, which has been determined from experiment as adequate to give the proper velocity and penetrating action.

After the gun is set up it is quickly sighted on a portion of the ring close to the shell. The gun is rapidly fired, and within three or four minutes a "key" is cut through the ring. This usually requires about 50 shots. The whole time required for stopping the kiln, setting up the gun and firing 50 shots, will not exceed 8 minutes; and with practice this time can be cut down to 5 minutes. If the ring is heavy, it is advisable to direct the gun to the opposite side of the ring and to cut a second groove or "key." With two grooves the ring can be quickly broken down by the burner, and when a larger ring breaks the mass rolls down the kiln in large pieces. An extra feature of this gun is that these large sections of rings can be shot to pieces; each piece of say, 12-in. size, requiring only one shot to break it into small particles.

The gun is at all times under perfect control. It can be held absolutely on the line sighted, which minimizes the possibility of missing the ring and damaging the kiln lining. A bullet from a high powered rifle will penetrate a ring, but it will also penetrate boiler plate in case the ring is missed. This new Remington gun shoots a slug which does not penetrate deeply, but transmits its jar over a large surface area. The use of this gun is economical, not only by direct comparison with the cost of labor used with former methods, but due largely to the saving in time. In using the gun, it is well to break the ring down before it becomes large, thus eliminating the condition in the kiln which always results from heavy ring formation; viz., the damming of a large mass of raw material just back of the ring, which is troublesome to handle when the ring breaks down. Breaking the ring during the early stages of its formation with a few well directed shots will greatly minimize kiln delay.

Portland Cement for November, 1924

Tables of statistics, prepared under the direction of Ernest F. Burchard, of the Geological Survey, based mainly on the reports of producers of portland cement but in part on estimates, indicate that production and shipments show seasonal decreases but that both are greater than in 1923; stocks are 28% higher.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT BY DISTRICTS, IN NOVEMBER 1924 AND STOCKS IN OCTOBER 1924, IN BARRELS

Commercial District	Production November 1924	Shipments November 1924	Stocks at end of November 1924	Stocks at end of October 1924(a)
Eastern Pa., N. J. & Md.	3,376,000	2,845,000	1,207,000	677,000
New York	655,000	523,000	511,000	379,000
Ohio, Western Pa. & W. Va.	1,277,000	932,000	817,000	472,000
Mich.	928,000	581 000	629,000	282,000
Wis (b) Ill, Ind. & Ky.	1,894,000	1,278,000	1,052,000	436,000
Va., Tenn, Ala. & Ga	1,095,000	1,070,000	314,000	290,000
Eastern Mo., Ia. & Minn.	1,313,000	782,00	2,034,000	1,502,000
Western Mo., Neb., Kan. & Okla.	943,000	737,000	1,078,000	872,000
Texas	384,000	358,000	242,000	215,000
Colo. & Utah	194,000	134,000	241,000	181,000
Calif.	887,000	890,000	361,000	364,000
Ore., Wash. & Mont.	195,000	159,000	439,000	403,000
	13,141,000	10,289,000	8,925,000	6,073.000

(a)Revised. (b)Began producing June, 1924.

Stocks of clinker, or unground cement, at the mills at the end of November, 1924, amounted to about 4,023,000 bbls.

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[1] See Cement Mill Section of CONCRETE, December, 1924, Page 110.

compared with 3,548, 000 bbls. (revised) at the beginning of the month.

IMPORTS AND EXPORTS

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in October, 1924, amounted to 211,228 bbls. valued at $331,506. The total imports in 1923 amounted to 1,678,636 bbls., valued at $2,964,098.

The imports in October were from Belgium, 125,309 bbls.; Norway, 49,960 bbls.; Denmark, 13,768 bbls.; Canada, 11,986 bbls.; Philippine Islands, 3,819 bbls.; Germany, 3,247 bbls.; Mexico, 2,788 bbls.; other countries, 351 bbls.

The imports were received in the following districts: Los Angeles, 52,235 bbls.; Philadelphia, 37,562 bbls.; Florida, 32,557 bbls.; Washington, 23,871 bbls.; San Francisco, 17,872 bbls.; Porto Rico, 15,841 bbls.; New Orleans, 9,246 bbls.; Vermont, 8,108 bbls.; Hawaii, 5,899 bbls.; Massachusetts, 2,508 bbls.; other districts, 5,529 bbls.

The exports of hydraulic cement in October, 1924, were 79,180 bbls., valued at $253,479, of which there was sent to South America, 29,075 bbls.; Cuba, 25,685 bbls.; to the other West Indies, 2,940 bbls.; Mexico, 9,183 bbls.; Central America, 8,104 bbls.; Canada, 590 bbls.; and to other countries, 3,603 bbls. These exports are exclusive of shipments to the following possessions: Porto Rico, 5,050 bbls.; Alaska, 3,269 bbls.; Hawaii, 1,120 bbls.

The statistics of imports and exports of hydraulic cement in November, 1924, are not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1923 AND 1924 IN BARRELS(a)

Month	Imports		Exports	
	1923	1924	1923	1924
January	71,686	153,732	74,169	88,586
February	20,529	162,930	88,531	62,606
March	66,521	160,517	98,861	91,224
April	76,899	148,138	85,662	83.200
May	88,480	161,304	103,634	88,850
June	111,559	196,655	77,203	74,064
July	286,106	109,098	82,774	60,139
August	324,008	192,634	73,201	85,883
September	215,785	134,245	77,121	69,470
October	172,051	211,228	74,302	79,180
November	140,590	(b)	85,743	(b)
December	104,422	......	80,487	......
	1,678,636	......	1,001,688	....

(a) Compiled from records of the Bureau of Foreign and Domestic Commerce.
(b) Imports and exports in November, 1924 not available.

Nebraska Company's Plea Denied

The Interstate Commerce Commission has denied the Nebraska Cement Company's plea for an order requiring construction of an interchange track between the Atchison, Topeka & Santa Fe and the Chicago, Rock Island & Pacific at Courtland, Kan. Because there are no facilities for the interchange of traffic between the two railroads at Courtland, shipments of cement from the Nebraska's mill at Superior in order to reach destinations on the Rock Island must move by one of three roundabout routes: west over the Burlington via Norton, Kan.; east over the Burlington to Endicott, Nebr., and north over the St. Joseph and Grand Island to the Rock Island at Fairbury; or southeast over the Santa Fe to Concordia, Kan., and thence over the Union Pacific to the Rock Island at Clifton, Kan. The cement company pays distance rates from Superior to Rock Island points and also represented that it seeks interchange at Courtland in order to expedite delivery, as rival plants can make quicker delivery than it can. The Commission found that the probable volume of tonnage over the Courtland connection would not be sufficient to justify construction and maintenance of the interchange track.

Dry Elutriation of Cement Dusts

In view of the interest which was centered round, and the hopes which were at one time cherished as to the recovery of potash from certain industrial processes in this country, it is instructive to refer to some experimental work in connection with the recovery of potash from cement dust which has lately appeared in one of our American contemporaries. Cement dust has been shown to be potentially a very important source of American potash, but production costs, as elsewhere, seem to indicate that the technique of the recovery of potash therefrom has not been sufficiently developed as to render the process attractive from a commercial point of view. Two American workers, Messrs. E. J. Fox and C. W. Whittaker, bearing this point in view, recently started out to investigate this particular phase of the problem in an endeavor to determine whether more efficient methods of recovery could be devised. Briefly, it may be recalled that the potash volatilized in cement kilns escapes from the charge as a vapor, and as such is carried along with the gas stream issuing from the kiln until the temperature drops to a point where the potash condenses, after which it exists as minute particles of potash salts in a highly dispersed state. When an electrostatic precipitation plant is interposed, all the dust particles and the greater part of the potash are brought down together. It will be generally agreed that, owing to the inherent difficulties which beset any wet method of separation, success can only be looked for in some direction other than that of utilizing water as a means of separation, for if a dry system is employed no elaborate equipment for treating the dust with water is required, while a dry process would eliminate everything in the way of evaporating and crystallizing problems.

In order to accomplish this end the American workers determined to experiment with elutriation in media that would not react with potash or the cement dust. In other words, air was used as a medium. It is not necessary to describe here in detail the construction of the elutriator employed, but it may be mentioned that a current of compressed air is forced through a nozzle which directs it downwards and with such force that the dust lying in the bottom of the apparatus is lifted and forced upwards through a stack. The particles which are small enough to be carried along by the air velocity employed are borne away over the top of the stack and arrested in a collector. On the other hand, those particles which are too heavy to be lifted by the air current fall backwards into a lower receptable in the apparatus, separation of light and heavy particles being thus attained. From a number of experiments which were conducted at various cement works the interesting facts emerged that the potash fume is not merely mixed with the dust but is deposited on the particles, that its distribution over all surfaces is apparently equal, and that in all samples examined the potash content decreased as the size of the particles increased. Accordingly, by employing a system of air elutriation of this nature it was found possible to obtain cement dusts the potash contents of which were approximately double those of the original. The process is, therefore, one of importance, not only on account of the improvement in concentration, but by reason of the freedom from water elutriation which it embodies.—*The Chemical Age.*

Intangible Assets of the Cement Manufacturer

By W. G. H. Cam
Power and Safety Engineer, Canada Cement Co., Ltd.,
Montreal, Quebec

From a paper read before the Cement Section, National Safety Council, Louisville Ky., Oct. 2, 1924.

In the course of the last twenty years, at Montreal, Quebec, the manufacture of portland cement has won a place among the basic industries of many countries. As in the iron and steel trade, the periodical expansion or contraction of the market for cement is a sure indicator of prosperity or depression of the country's commerce.

And this is to be expected, for the prosperity of a basic industry depends primarily on confidence—confidence in the continuity of things as they are.

To establish this confidence is the business of a stable government, operating on the minds of citizens of the home country by far-sighted sober legislation, and reaching out to the minds of business men of other countries, by uniformly equitable, straightforward and fearless dealing in foreign affairs.

Wars upset confidence and breed a flock of unrealizable ambitions and hopes which it takes years of disillusionment to annihilate. Six years after the Great War, we in Canada are still laboring to rebuild this confidence on the ruins of false hopes. In these efforts, curiously enough, it is the younger generation who, by their imperfect knowledge of the terrible sacrifices that the war involved and of the intolerable burden of debt which is their heritage, are best equipped for restoring the confidence of the world in a future which only they can see in a rosy light.

What is revolution and upset of normal conditions to elder men, is viewed by the rising generation as a splendid process of house cleaning, a sweeping away of worn-out superstitions and shibboleths, and the establishment of a sane order of things in which all handicaps will be removed and all the prizes are for open competition.

In increasing numbers, this younger generation is recruiting the electorate that supports the government of the day in all lands where parliamentary institutions prevail, so whether we will or no, the reestablishment of confidence lies in their hands: They are the promoters of national and international confidence.

Confidence and Credit

Confidence begets credit, and credit is the life-blood of enterprise and progress in business and of prosperity, individual, municipal, and national.

The market of the basic industries of a nation waxes and wanes with its prosperity, which is built on credit, internal and external, which derives from confidence in stable relations between man and man in domestic as in foreign affairs.

Credit, national and international, is the foremost intangible asset which contributes to the success of the cement manufacturer, and this asset is evidently out of his control, but it creates the market or demand which he is in business to satisfy.

His organization for this purpose depends for its success on certain prerequisites.

Means must be available to acquaint potential customers with the nature and use of his goods, and facilities must be provided to convey those goods promptly and surely to his customers. So the second intangible asset is a publicity system and promotion service.

To a certain extent, this is provided by the public press, but in North America, the Portland Cement Association was organized to supplement the means already available, and promotion work is one of the activities of the manufacturer's employes. This work is, of course, primarily the business of his publicity department, but it may be recorded in passing that every employee in the organization, however humble his position, can play his part in popularizing the product of his firm.

The third intangible asset is a transportation system, with which may be linked fuel and power supply. The manufacturer will locate his plants strategically by a consideration of the grouping of demand and the various means of transportation available. Cheap coal or cheap power are contingent assets which will serve to weight his decision, so that these three items can be summed up in one word: Location.

We now pass from the realm of assets over which the manufacturer has no control or only partial control, and we come to those assets which may be broadly described as company policy, that is to say economy and good will.

Economy and Good Will

Economy or good housekeeping means the use of the means available for a certain purpose so that there shall be as little waste as possible in arriving at the end desired.

There may be waste of materials or of power through poor purchasing methods, reckless usage, or inadequate maintenance. There may be waste of human effort through poor purchasing methods, reckless usage, or inadequate maintenance.

Under good will are included the relations between the customer and the company, between employe and management, and between employe and employe. So in consideration of human efforts in industry, economy and good will are interlinked and cannot be separated.

Herbert Hoover makes the statement that "management has the greatest opportunity and hence responsibility for eliminating waste in industry."

As to the manner of man that is best fitted to undertake the heavy responsibilities of management, Gerard Swope, president of the General Electric Co., gives the position to the engineer, and many of us will endorse his argument.

"To my mind," he says, "there is no better basis for human work than study along engineering lines, because it trains in exact analysis. If you will give to the engineer also cultural training, so that he has something of the history of the development of a people, of its civilization, of its tendencies—so that he can look upon social movements as they arise with some tolerance and also with sympathy, because one needs synpathy in life—then it seems to me that the engineer is the best fitted of any profession to grapple with the problems of life.

"When the problem of establishing better relations between labor and management is solved, and the men find greater pleasure in the work they do, and receive remuneration commensurate with the service they are rendering, the engineer will have performed his greatest service. The engineer's training fits a man perhaps better than any other profession for this service to the community—and in service of that character any human being is going to find the best satisfaction and the greatest happiness."

Management and Man

Now the soundest asset that a manufacturing plant can have is a body of men who are healthy, content with their surroundings and living conditions, proud of their jobs and of the progress of the plant, interested in each other, and loyal to the company. Such a working force is an army which can be relied on to rise to the height of its opportunity.

If ever and whenever the relations between management and labor touch perfection in any plant, you may safely predicate such circumstances. In such a plant, the management has achieved a perfect machine for carrying out the process of manufacture according to plan. It is a trite saying that all the trouble in the relations between employer and employe arise from the employer regarding the man in his employ as a machine. Perhaps he did so regard him once, but he couldn't make the same mistake now.

Management has now to devote a great part of its purposeful thinking to the study of methods of inducing in the worker the disposition and habit of through which will make him ready and willing to play his part in the process of manufacture.

It must be understood that the fundamental complexity of the problem derives from the fact that the major interest of the management is only a contingent interest as far as the worker is concerned. The survival and progress of the company is management's major concern: the survival and progress of himself and his family is the major concern of the worker. It is true, of course, that the individual officials comprising the staff of management—from general manager down to foreman—have a major personal interest identical with that of the worker, but their superior mental training and wider experience makes obvious to them what is neither obvious to the mind of the worker, nor necessarily true in his case: namely, that their tenure of office depends mainly on their successful administration of a sound company policy. Therefore, in my argument, management is treated as a corporate body and the worker as an individual. Trade unions are the outcome of an attempt to marshal the workers into a similar corporate body with unified aim and policy independent of management's control.

The thinking of the worker is mainly emotional: made of hopes and fears, of jealousies and enthusiasms, of love and hate. The thinking of the management is thought directed toward an object: corporate motivated thought, dispassionate and reasoned. So the attitude of the management towards the problems of the individual worker is necessarily judicial, while the judgment of the worker as regards the attitude of the management is necessarily emotional. The problem is further complicated by the fact that while the worker as an individual can and will practice control of his emotions, men in a group have a kind of corporate soul whose emotions are far more unstable, far less accessible to reason than in the individual. This it is that accounts for "esprit de corps," the corporate enthusiasm which the body of workers in a plant at times displays, when every man strains every nerve to attain some object which has been set before them. In other circumstances, a similar unreasoning corporate emotion is inflamed with suspicion and hatred, and strikes or riots are the outcome.

Mobilization of Worker Effort

The approach of management to the worker must therefore be by way of emotional appeal, and it must be an appeal of so elementary a kind that it will be understood by the foreigner and the illiterate, as well as by the native-born and educated.

If you want to gain the confidence of a young child, you will show him a picture book, and do any small services for him that you are able. You will gain his confidence largely by what you do and not by what you say. So it is by services rendered, and by the display of pictures, that a first appeal is best made to the feelings of the worker, and it is because an accident prevention campaign uses these methods, that such a campaign has been found by experience to sway men to a belief in the good intentions of the management more surely than any other form of benefit.

"Accident Prevention Pays" is now as established an axiom as "It Pays to Advertise."

Just as the advertisement preempts the thoughts of the casual observer and creates a want that is not of his own originating, so the safety poster, first aid work, medical inspection, shop inspection committee, and safety committee work preempt some of the worker's thinking and tend to make of him a "safety man," that is to say, a man who will look after himself and his fellows, and who is convinced that that is also the desire and hope of the management. So the leaven works, and a group opinion is formed that the management is out to give the men a square deal.

I would stress the point that there is no reasoning in the formation of this opinion. The opinion precedes the reasoning, and it is the force of group opinion, an emotional appeal, which subsequently develops plant loyalty.

Plant prestige, another product of group emotions, is fostered by interplant competitions in safety records, games, or even production efficiency.

Accident prevention campaign work, then, comes first in the plan of the management for developing what is known as "better morale of the working forces." The subsequent items in the program are directed towards safeguarding the health of the worker (sanitary conveniences, baths, lockers, plant restaurants), assisting his social intercourse (clubs of various kinds, picnics, and outings), improving his home comforts (housing and gardens), giving him recreation (athletics and playgrounds), encouraging thrift (old age pensions and employe stock distribution), and providing educational means for himself and his children.

This is called *welfare work*, and the policy was summarized by Judge Gary, of the United States Steel Co., in 1911 in these words:

> It is not important to consider what the treatment of the employer by the employe is or may be. The man who has the intelligence and the success and the capital to employ labor, has placed upon himself voluntarily a responsibility with reference to his men which he cannot escape and ought not to endeavor to escape. Satisfy your men if you can that your treatment is fair, reasonable and generous. Make the plant a good place for them to work and live. Don't let their families go hungry or cold; give them playgrounds and parks and schools and churches; pure water to drink, every opptunityor to keep clean; places of enjoyment, rest and recretation; treating the whole thing as a business proposition, drawing the line so that you are just and generous and yet at the same time keeping your position and permitting others to keep theirs, retaining the control and management of your affairs, keeping the whole thing in your own hands, but nevertheless with due consideration to the rights and interests of all others who may be affected by your management.

Labor Attitude on Cooperation

One more quotation, to suggest the validity of this policy as an answer to the workers' viewpoint. The president of one of the railroad unions, speaking recently on that much-abused catch-word Cooperation, said:

> I think of the railroad as two million men. Without the lives, the muscles and brains of the men who do the work, whether in the section gang, in the shop, in the cab or in the office, the dollars would not earn one cent of revenue, the tracks would never feel a locomotive, the shareholders and their directors would have nothing of value to own and nothing to direct. And the men, because they furnish the energy of the vast machine, and because they are human, largely determine whether the machine runs well or whether it runs badly. At the one extreme, if they are all able and turned to their highest joint capacity and the morale is high, we have the possibility of a railroad giving 100 per cent service; if on the other hand the opposite is true and the morale is low, we have a pile of junk and a deficit.
>
> What is morale? In part it is an individual matter. It depends on the good will and the energy of each single man. If every mán does his full part, each task is done well and waste is stopped. If the men are careless, indifferent or worried, the machine slows down; its efficiency is impaired and its production is decreased.
>
> Cooperation is a word much used, but little understood. If I am boss, and you want to help me, I may ask you to cooperate. But when you ask me to do something you desire in return, I tell you to put on your hat and shut the door from the outside. Two people do not cooperate if one of them does all the work and the other has all the advantage.

In the economy of manufacture, management designs the plan, just as the general staff of an army designs the plan of campaign. To carry out the plan, management appoints officers who take charge of the detail instructions and hand them down to the rank and file. True cooperation is needed between man and man in a department, and between one department and another, individual cooperation and group cooperation. But cooperation is not needed between the rank and file and the general staff. Acquiescence and faith are demanded.

And in return for this subordination, the management—that is, the general staff—undertakes or should undertake the care of the material and moral needs of the rank and file.

This is not slavery: it is a free contract, and if observed by both sides, there is no loss of self-respect by reason of the fact that labor barters its services to get what it wants.

Human Nature

In considering this preeminently important though intangible asset of the cement manufacturer—worker morale—we are dabbling in social science, a science which has been so little explored and the laws of which are as yet so nebulous that people can still be found to deny that such a science exists.

In other words, very few generalizations with regard to human nature are of universal application. Temperament, mental development, and experience are three independent variables which baffle the seeker after the human equation. All that we can be sure of is that every man feels in a greater or less degree the emotions that we share with the higher animals. How are we to find out what will be the thoughts of a certain man under certain circumstances? Our nearest guess is to imagine ourselves in his place, and that, however agile our imagination may be, is liable to be a poor approximation, for we cannot participate in the personal history that has made him what he is.

As a result of many generations of social intercourse, we have learned to label as "common sense" any thought which we find by experience that the majority of men with whom we have to do would evolve as the sequence to a certain event or series of circumstances.

Now the major interest of management, as regards the men employed in the company's service, is to engage and hold at all times a working force which will constitute an intelligent, willing, and disciplined human machine, adequate, but not more than adequate, to produce the required output, and imbued with that spirit of individual and interdepartmental cooperation which will secure proper maintenance of the plant machinery and good housekeeping. *The major interest of the individual worker is security.* It is common sense that this want should take the first place in his mind. His hopes and ambitions can hardly have the same urgency.

So we can see why industries having a fluctuating or seasonal demand for labor, appeal only to a limited extent to workers of the better grades. The civil servant is satisfied to work for a small salary, because he is convinced that, subject only to the quality of service that he gives, he has obtained a life job. That spells security. But the worker in industries where labor demand fluctuates, until he graduates into the foreman class, is rarely offered such security. Lay-offs are frequent: shut-downs occur from time to time, and in some plants even annually. Peaks of demand now and again make necessary the employment of casual laborers who have no interest in the plant except as providing a temporary job. There is a procession of transients. In six months, 30 jobs have been held by as many as 250 men in the experience of one plant, and that is no strange occurrence in a large group of industries.

All that such plants can do for the worker by accident prevention measures and welfare work becomes insignificant when they are unable to offer an intelligent, willing, thrifty man a permanent job. Hope of "better worker morale" must be postponed if a superintendent is incapable of offering on his side of the contract a fair prospect of the security for which the worker is prepared to barter his loyal service. How can casual laborers, temporary employes, feel that they "belong." It is impossible. They will work for the wage, nothing else.

Labor Needs Promise of Security

And it should be remarked that industries giving only seasonal occupation, or having a fluctuating labor demand, have actually created on this continent a floating labor aggregate of men who have never stayed long in a job and do not expect to, who are unmarried because they cannot or will not face the responsibilities involved, and who form the depreciated currency of the labor market. Among them, unemployment is accepted as a natural intermittent condition, and promotes the instinctive tendency to laziness and the desire to get as much money as possible while giving the least possible return for it in honest endeavor.

So in pursuit of better "worker morale," the management of a company is handicapped, first, by the fluctuation of labor demand incidental to the industry in question, and second, by the quality of worker who makes application for the jobs available when labor demand is on the increase. *The more permanent full time jobs a plant is in position to establish, the better will be the opportunity of cultivating good worker morale.*

Security, which means primarily a fair annual living wage—and second, the various advantages that we have grouped together as "welfare work"—is what attracts the intelligent, willing, thrifty man. It will attract others, too, of a less desirable kind, but an experienced superintendent or employment manager, with the aid of medical inspection, will readily separate the wheat from the chaff.

Much of the floating labor is foreign-born, and lacking command of the English language, such men in this country early receive a harsh training in the predatory instincts of their fellow-men, and cultivate thereby an absolute distrust in the humanity and straightforwardness of employers that nothing but years of painstaking education can eradicate.

How well the safety engineer knows the difficulties that surround the offer of fair compensation to an illiterate foreigner whose knowledge of English varies in inverse ratio to the degree of his distrust in the investigator!

Labor Turnover

It has been pointed out by responsible opinion at various times that labor turnover is a heavy charge on most industries: that each new man engaged costs anything from $8 to $200 to train, and in American plants, one to three times the number of men on the plant force represents the turnover of one year. I have indicated that, to a certain extent, this turnover is due to the existence of a floating population of transient temporary labor, but there is no doubt that some part of labor turnover is controlled by management, and as worker morale and accident liability are involved, the subject deserves study. Men may be hired who are unsuitable: the job may be misrepresented: patronage in hiring may develop if a foreman is allowed to select freely men of his choice: pay may be inadequate: prospects of promotion may be lacking: foremen may be incompetent: workers may be hired who live too far from the plant. Fluctuation of labor demand is not entirely dependent on market conditions, for if the physical condition of the plant is poor, either there will be an excessive number of repair men on the pay-roll, or partial shut-downs for emergency repairs will affect the pay envelope and damage the plant prestige.

Each plant has its local problems: a plant that is isolated and draws its working force from a farming community will, as a rule, suffer very little in its employe list by reason of seasonable shut-downs, as the men laid off will retire to their farms with the assurance that they will recover their jobs when the plant resumes operation. On the other hand, with a plant in the suburbs of a large city, shut-downs usually involve a large labor turnover, and accident frequently increases on the resumption of operations. For the city worker, as a rule, has no alternative occupation, and, just as a cement plant will at certain seasons of the year recruit, for example, from the lay-offs of a shipbuilding firm or a sugar refinery, so the city cement worker who is laid off will, if possible, find occupation in another industry. It is, however, to the credit of management in the cement industry that cement workers show a tendency to return to cement plants when occasion offers. Undoubtedly, in recent years, much has been done in cement plants to make the cement worker's job more pleasant. It was never a very strenuous job, with the exception of one or two departments; there is less justification for the eight-hour, three-shift day in a cement plant than there is in most other industries. But it was in the old days a dangerous dirty job, with exposure to bitter cold in the winter and intense heat in the summer.

Even nowadays the majority of plants are excessively dusty, and the popularity of the kiln room in winter has not appreciably diminished. But now there are wash-rooms, and conveniences, and lockers, and pure drinking water; new standards of good housekeeping have been set, while accident prevention campaigns and committee work have interested the plant force in the progress and objects of the company, so that the posting of a daily production record is of real interest to the men, and plant periodicals are appreciated by a widening circle of readers.

The test of a well-managed concern comes in hard times, which put on trial the quality of foremanship that has been developed in a plant. For the foreman is the instructor of the rank and file and the interpreter of management's policy. To get and keep the kind of man who will identify his personal interests with the interests of the company, who will defend the company's resources when the pinch comes, and inspire confidence in the management by his actions and conversation, every effort should be made to build up a large nucleus of permanent jobs, for the men holding these jobs are in the right circumstances to develop such qualifications. They should be encouraged by committee work, and by prompt executive action wherever possible on their recommendations, to take a pride in the physical betterment of the plant. They should receive a direct reward for any product of their ingenuity improving any detail of plant economy. They should be stimulated to feel that a good accident experience is one of the principal objectives that the company delegates to their charge, holding the well-being of the employes as a matter of first line importance. And the more desirable the job has been made, the greater must be the care exercised by employment manager or superintendent in selecting his man. Patronage and nepotism must be excluded, and merit must get precedence over seniority. The ability to effect this is one of the more important qualifications of a good superintendent, and one calling for considerable tact, a quality that is uncommon but beyond price.

Without the loyalty that the right sort of permanent employe undoubtedly acquires towards the company whose prosperity means his livelihood, plants are bound to suffer sporadically from half-hearted and discontented workmen, petty thefts, absenteeism and maligning, favoritism and back-biting, and welfare work is liable to be misunderstood or to degenerate into paternalism. The permanent employes are at present the backbone of any plant. Our ideal should be to make of them the entire worker body.

Dolomite for Refractories

The dolomite refractories investigation being conducted by the Department of the Interior at the Ceramic Experiment Station of the Bureau of Mines, Columbus, O., includes a study of the many fluxes which could be used to aid in the dead-burning of dolomite, and also a complete survey of the iron oxide-alumina-silica field as fluxes. The temperature of calcination and the resulting properties have been carefully investigated, and the most desirable calcines chosen for further investigation in the making of dolomite bricks. Many binders and the several methods in common use of fabricating bricks commercially have been tried, and a thorough study has been made of the properties of the most successful ware.

The results of the work of the Bureau of Mines investigators indicate that by employing the proper fluxes in the proper proportions, it is possible to dead-burn dolomite when properly sized and under proper heat treatment, to a grain that will not slake after long exposure to the air nor under the more severe auto-clave treatment. Several binders for the ground grains have been found to give promise, while two of this number are especially satisfactory. It is possible to make shapes from ground sinter, by both the semi-dry press and slop-mold methods, which, when properly fired, will not slake upon prolonged exposure to the weather. The bricks thus made have physical properties which indicate that they will probably give good service as a basic refractory.

Details of these investigations, looking toward the utilization of dolomite for refractories, are given in Serial 2627 by G. A. Bole, copies of which may be obtained from the Department of the Interior, Bureau of Mines, Washington, D. C.

French Cement Industry Forced to Seek Foreign Markets

By Vice Consul William W. Corcoran

BOULOGNE-SUR-MER

From Department of Commerce Bureau of Foreign and Domestic Commerce, Washington. *Special Circular No. 208*—Mineral Section (Iron and Steel Division).

France must find new markets for her cement manufacturers or her great cement industry must renounce expansion for retraction, if conclusions can be reliably based on a survey of the industry in the Department of Pas-de-Calais, from which territory, during 1923, more than one-sixth of the national production came, and where during the same period more than one-fourth of the country's artificial portland cement was made.

Since the end of the war, the French industry has had its capacity taxed in the supply of the home needs. In the Pas-de-Calais where, because of abundant raw materials, a very high grade of portland artificial cement is produced, the movement of expansion, the enlargement of the existing factories and the construction of new plants, has been especially pronounced since the beginning of 1919.

There were the extraordinary demands of the devastated regions and the activity of building operations through the entire country. Certain concerns doubled and some trebled their producing capacities. All production was devoted to the national consumption, and in the meantime, the Belgian and German manufacturers won important markets, which prior to the war were possessed by the French.

Now the Pas-de-Calais industry finds that the home consumption has reached its limits. If the factories are to continue their present rate of production and expansion, they will be able to do so only by the acquisition of new world customers.

The prices per metric ton of cement show but slight variations during the past two years, when considering the quotations in French francs. The increased production has had a pronounced effect in keeping prices almost stationary, notwithstanding the depreciation of the franc and the coincident rise of coal, and, though less important, of labor and transportation. Cement prices in the Pas-de-Calais region are based on the English standard of computing, that is, the price of a metric ton of coal is divided by two, to which is added certain fixed costs, involving labor, etc.

During 1922, the price per ton of cement was 120 francs, in 1923, 110 francs, despite the decline in the value of the franc and the consistent augmentation in the price of coal. During the first two months of 1924, some manufacturers continued to export cement at 110 francs per ton. These prices were quoted for the cement at the factories. The prices on wagon at the port of Boulogne-sur-Mer are from 5 to 10% higher than the factory price.

In the Pas-de-Calais region alone during 1923, the output exceeded by 352,000 tons the production of the preceding year. The French national production for 1923, according to statistics compiled by the national association of French cement manufacturers, known as La Federation des Chambres Syndicales des Fabricants de Chaux et Ciments, was 5,932,600 metric tons, or 1,137,450 tons greater than the production of the preceding year. Of the 1923 total, the Pas-de-Calais factories turned out 1,063,000 tons, of which 1,043,000 tons were artificial portland cement.

Despite the decrease in prices—for although the price in francs remains practically stationary, the value of the French currency has depreciated—and the failure to win other markets, the Pas-de-Calais industry still adheres to its program of expansion.

Its production during 1923 was not its capacity production, for, if the industry had been taxed during that period as it had been in the preceding years since the war it could have turned out from its factories approximately 1,250,000 metric tons. This is the estimated present capacity production of the Pas-de-Calais factories. With the completion of the plans of expansion, it is estimated that the industry will have at the close of the year 1924 a capacity production of approximately 1,500,000 tons.

It is interesting to note at this time, the statistics on French cement exports before and since the Great War. The statistics for 1913 can not be obtained but during 1912, the French cement industry exported to foreign countries and French colonies 360,355 metric tons of cement. During 1921, only 135,078 tons were exported while in 1922 and 1923, 199,171 tons and 270,359 tons, respectively, were exported to foreign countries and French colonies. The export figures for the port of Boulogne-sur-Mer were as follows: 1913, 217,455 tons; 1919, 11,339 tons; 1920, 1,985 tons; 1921, 12,635 tons, and in 1922 and 1923, 20,255 tons and 19,634 tons, respectively.

The stated capital of the 14 concerns operating the 16 factories in the Pas-de-Calais, is approximately 70,000,000 francs. The value of the factories and the property owned and exploited by the concerns is variously estimated at from 150,000,000 to 200,000,000 francs. The capital is almost exclusively French controlled. More than 40,000 persons are employed in the industry. These employees are mostly French, although there are a number of Poles and Portugese also employed.

The Pas-de-Calais factories ship cement in barrels and sacks. When the cement is shipped in barrels, it is estimated that the barrels alone cost 60 francs per ton, each barrel being valued at 10 to 11 francs apiece. There are 5½ barrels to each metric ton, the weight of each, including the cement being approximately 180 kilos. When the cement is shipped in sacks, each sack contains 50 kilos. The sacks in which the cement is shipped are billed at 2.50 francs apiece. If returned to the manufacturer in good condition with freight paid, they are redeemed by the manufacturer at 2 francs each.

Gypsum in 1923

The quantity of gypsum mined in the United States in 1923 exceeded 4,000,000 short tons for the first time. The output showed an increase of 26% over that of 1922, according to the report of the United States Geological Survey.

The total quantity of gypsum sold crude to portland cement factories in 1923 was 15% greater than in 1922. New York was the only state which reported a decrease of 15% in such sales. Increases in other important producing states ranged from 10% in Oklahoma to 67% in Iowa.

Sales of Keene's cement increased 6% over those of 1922, but the receipts from sales decreased. The average value per ton dropped from $14.75 to $13.88. Of the total quantity of crude gypsum sold, only 3% was sold for use in agriculture, a decrease of 75% from the sales of 1922.

Rigorous Weather Halts Canadian Lime Production

The sudden advent of rigorous weather including a heavy snow storm and zero weather, caused a discontinuance of operation in some of the eastern Canadian lime manufacturing plants before the close of November. These will remain closed until early in April, or the latter part of March. The larger plants will remain open all winter, unless the demand for lime weakens.

Although the market is not at its best at present, some of the manufacturers are continuing operations but not shipping to the United States as usual. The lime is being barreled and stocked in warehouses or outdoors, in readiness for shipment early in March so as to be first on the ground when the demand is strong. But for the United States market, the Canadian lime producing plants would diminish to about 15% of the existing number, as practically all the plants ship the bulk of the manufactured product to the United States. Boston is the destination of a large proportion of the Canadian lime, when shipped by water, and the lime is thence distributed by rail to other New England and eastern states, and even shipped to the far west and to the extreme south.

The Brookville plant of the New Brunswick Lime Co. will remain open all during the winter months as usual. This plant was opened about five years ago and has been maintained steadily since the opening. The Fraser Companies, a progeny of the original Fraser Lumber Co. of Fredericton, N. B., are also understood to be planning on operating during the winter at the Plaster Rock and Edmundston lime quarries, and the Clairmont Lime Co. also intends to manufacture lime at Torryburn through the winter. In fact only the old style kilns are equipped to close during the winter period. In later years, the installation of modern equipment has changed conditions greatly in lime manufacturing, and many of the old style kilns have been abandoned and new plants erected. Indications are that efforts will be made to redeem some of these abandoned plants in the spring, for the 1925 season at least, in instances where general repairs are unnecessary.

Super Cements

Some opinions from the German investigators as to the comparative values of the so-called super cement are given briefly by J. C. Witt in *Chemical Abstracts.* According to the findings of Otto Graf, portland cement and other higher grade cements compared from the standpoint of the construction engineer, show that in general, the super cements are preferred for their greater strength, early high strength, resistance to chemical action and low shrinkage. They are less desirable for their low elasticity, dark shade and high cost. As to the effect of the water-cement ratio in the mix and also the time of set, they are similar to portland cements.

H. Muller suggests using richer mixes of normal portland cement instead of more costly super cement where increased early strengths are desired. In refutation of Muller's statement, Otto Strebel presents a few data to show the superiority of super cements over normal portland cement.

According to Nitzsche, the action of a 7.5% solution of magnesium sulfate ($MgSO_4$) on fused cement briquets was very slight during a 12-month period; at 90 days, tensile strength of 34.7 kg. per sq. cm. and crushing strength of 702 kg. per sq. cm. were obtained. On longer immersions, the former strength increased while the latter decreased slightly. The contraction of specimens of both neat fused cement and 1:3 mixes with sand in a 2.4% $MgSO_4$ solution, allowance being made for intermittent immersion and drying period, was the same as that of check pieces in tap water.

Babcock & Wilcox to Handle Pulverized Coal Business

The Fuller-Lehigh Co., Fullerton, Pa., recently entered into an agreement with Babcock & Wilcox, Ltd., of London, England, to operate under the Fuller-Lehigh patents, whereby everything in connection with its pulverized coal business will be handled in the various countries throughout the world by Babcock & Wilcox, Ltd., of London, with the exception of the United States, its dependencies, Canada and Mexico.

Babcock & Wilcox, Ltd., has modern and up-to-date manufacturing plants in many parts of the world, thus enabling parties in these various countries to save the duty and freight on the material, also making it practicable to install the necessary equipment for the use of pulverized coal much more extensively. This fact it is believed should materially increase the use of pulverized coal throughout the world.

Babcock & Wilcox, Ltd., has taken over a large number of the members of the Fuller organization, who have specialized for years in work of this kind, and in this way will have experienced engineers to handle this department. Since the agreement was concluded between these two companies, Babcock & Wilcox, Ltd., has secured a number of contracts in various parts of the world to equip boilers to operate with pulverized coal.

New Lewiston Cement Company

The Lewiston Portland Cement Co. has been formed with general offices in Lewiston, Idaho, for the manufacture of Indian Head portland cement and lime products. The mill site upon which it is planned to build a two-unit plant with a capacity of 2000 bbls. per day, using kilns 9 ft. x 160 ft. joins a large deposit of clay which rises to a height of from 30 to 60 ft. above the mill and which can be put in to the mill by a short gravity tram. The lime deposit is considered unique in the U. S., if not in the world. It is a marble formation ranging from jet black to almost pure white and rises quite precipitously from the bed of Mission Creek to a vertical height of something over 500 ft. It covers an area approximately 1000 x 2000 ft. T. J. Klossoski is chief engineer for the company.

Effective December 1, the Universal Portland Cement Co. will quote, sell and invoice cement by the barrel and not by the sack.

On June 1, 1923, that company began handling business on the basis of the sack instead of the barrel. This change was made after a questionnaire on the subject had been sent to its customers and the majority had expressed a preference for the sack.

Since that time, however, the Universal company has found that many cement buyers, although purchasing by the sack have continued as for years past to handle their own business on the barrel basis. Requests were received from many customers that dealings with them be conducted by the barrel.

Proper Cleaning of Cars Urged

In a report issued by the special committee on cleaning of cars of the Ohio Valley Shippers' Regional Advisory Board, the committee's belief is expressed that to obtain the best results, the members of the board and the railroad representatives should follow some plan of education among the receivers of freight to fully unload cars and remove all debris, and that the railroad should be just as watchful to prevent refuse being placed in cars by their employes. The report states that acknowledging the obligation rests with the railroads to provide cars which are in a serviceable and suitable condition, the failure of the consignee to clean cars, remove all refuse, blocking, nails, etc., is admittedly responsible for much of the condition. It is recognized that it would be impossible for the railroads, themselves, to guarantee clean cars to shippers, and the failure of a consignee to clean cars while unloading the shipment is considered an abuse.

The following recommendations are made:

That the Ohio Valley Shippers' Regional Advisory Board call to the attention of its members and receivers of carload freight, the necessity and importance of their cooperation with the railroads in their effort to increase car movement and car supply by removing from carloads received by them, all refuse, blocking, dunnage, etc., when they are releasing the contents of the car.

That it be considered an abuse of equipment whenever a consignee does not clean a car of all refuse, blocking, bracing, nails or other material used to protect the shipments received.

That the railroads issue instructions to their forces or representatives instructing them to report the failure of a consignee to clean cars and that such reports be furnished to the Chairman of that particular Commodity Committee and to the District manager of the American Railway Association, for corrective action.

That when a shipper receives cars for loading, containing refuse, etc., he should immediately advise the local railroad representative and the Chairman of his Commodity Committee, who should investigate the cause for the former consignee not removing the entire contents of the car when made empty.

That the railroads use especially assigned cars for the handling of refuse from freight houses, team tracks, driveways, or for yard cleaning, so that shippers will not receive cars that have been used in this service and not properly cleaned when unloaded.

That to speed up transportation, which is a certain added car supply, the Chairman of each Commodity Committee advise the shippers in his group, of the full cooperation desired and that the Board request the railroads to circularize their agents or representatives, who come into daily contact with the shippers, so that we obtain the fullest cooperation at the loading and unloading points where it does most good.

W. S. Morrison, traffic manager of the Indiana Portland Cement Co., Indianapolis, is vice chairman of the Cement Committee.

Selecting Valves

In the selection of valves, as in the selection of pipe, numerous factors must be considered. The valve, first of all, must be of the right type, gate, globe, cross, etc., and it must be suitable for the liquid or gas to be handled. Valves are commonly made of many metals including malleable iron, cast iron, ferro-steel, brass, and brass alloys. Where water is to be handled its acidity should always be given consideration. In large and long pipe lines carrying steam, strong and tough valves are essential because of the expansion and contraction strains, possibility of water hammer, stresses caused by the weight of the pipe itself, probable misalignment on erection and the possibility of settling after erection. Also investigate the possibility of cutting effect by the steam on the valve disc and seat as the steam passes through. This cutting effect is particularly noticeable in certain types of reducing valves in which the disc is held close to the seat. The reducing valve that operates wide open most of the time is invariably more durable than other types. The best practice limits the size of screwed valves to 6 in. To find the limiting water pressure of a valve multiply the limiting steam pressure by 1.2 for sizes larger than 12 in. and for sizes smaller than 14 in. multiply by 1.4.

Silicic Acid in Portland Cement

Previous conclusions that orthosilicic acid occurs in portland cement are confirmed by F. Hart, in *Zement*, and outlined briefly in *Chemical Abstracts*. A sample of cement which showed "dusting" revealed in the dehydration curve of its gel, breaks at 35.69% and 31.27% H_2O, corresponding to orthosilicic acid and $2SiO_2\,3H_20$. The dehydration curve of gels of separates retained on and passing 5000 meshes per sq. cm. showed one break at 37.9% and two at 37.7% and 33.1% H_2O respectively. This, it is stated, supports the current opinion that a silicate low in calcium oxide, CaO causes the "dusting" of cement.

Cement Industry in Far East Inactive

Owing to the lack of construction and the keen competition from stock liquidation, the cement industry in the Far East is stagnant and some mills are closing down. The tariff board is still considering measures for protecting the industry, but it is unlikely that action will be taken since the bills are being opposed by the chambers of commerce throughout the country.

The Indian stores department is becoming quite active in making purchases of various kinds of equipment and supplies for the use of the public service. American firms, however, are slow to take advantage of the provisions of the new stores rules, and consequently are not figuring to a great extent in these purchases.

Cement Company's Signs Show Road Map

A number of signs have recently been erected by the Marquette Cement Mfg. Co. in the vicinity of Chicago, each bearing a map which gives the motorist the exact lay of the land, telling him just where he is and how to get where he wants to go. Wayfarers have come to depend upon the signs for their direction and have commented favorably upon their usefulness.

Peruvian Cement Production Improved

The Peruvian Portland Cement Co. has been refinanced, the capital being raised to 76,500 libras ($313,650 United States currency). The new plans include an increase of production to 500 bbls. a day.

Universal Makes New Prices

A tabulation of current net prices of portland cement in barrels issued by the Universal Portland Cement Co. on December 26 shows decreases ranging from 6c per bbl. at Cedar Rapids and 9c a bbl. at Toledo to 10c per bbl. at Chicago, Ill., Cincinnati, O., Davenport, Ia., Indianapolis, Ind., Milwaukee, Wis., and Peoria, Ill.

The prices which are all exclusive of package and are to the contractor in carload lots, f. o. b. points listed are as follows for some of the principal cities:

Chicago, $2.10; Cleveland, $2.39; Detroit, $2.40; Milwaukee $2.25; Minneapolis, $2.42; Pittsburgh, $2.19; Toledo, $2.36

Men and Mills

Notes from the Field

Contract has been awarded for the construction of the Linwood Cement Co.'s new cement plant and the construction work will be done by the Henry W. Horst Co., Rock Island, Ill. J. C. Buckbee, 1733 First National Bank Bldg., Chicago, Ill., is supervising engineer. The Linwood Cement Co. is located at Davenport, Ia. and J. S. Schroeder is secretary and treasurer of the company.

The Oklahoma Portland Cement Co., Ada, Okla., plant No. 1 will start operation January 1st after being down since last July. Mill No. 2 has been operating continuously since its erection in 1920.

This winter the company has added two well drills and one No. 92 electric shovel with crawlers, to its new quarry which is to be opened by spring.

At the crushing plant there has been installed a No. 7 Hammer Mill to reduce the stone from one inch and under so as to give the raw grinding mills a uniform feed.

The company has about 500 trees planted around the plant property and driveways, and this winter will add 250 more, making the plant yard very attractive from the highway.

The Macdonald Engineering Co., Chicago, has recently closed a contract covering cement storage silos for the Wolverine Portland Cement Co., of Coldwater, Mich.

C. Leonardt, president of the Southwestern Portland Cement Co., has recently had installed in the El Paso plant a Griscom-Russell evaporating plant, including a deaerator. All boiler feed water is evaporated and this combined with the turbine condensate is deaerated and pumped direct to the Babcock & Wilcox waste heat boilers connected to the kilns.

This new plant and a good quality of coal the company is burning in the kilns increase the steam production equal to plant requirements, making it unnecessary to fire any of the hand fired boilers this winter.

Richard K. Meade & Co., 11 E. Fayette St., Baltimore, Md., has prepared plans and specifications for a large lime plant which is to be built by Ramon Ferreyra, at Cardoba, Argentine. The first unit of this plant will have a capacity of 100 tons of lime daily and will be followed immediately by two other units which will bring the total capacity up to 300 tons daily. A hydrating plant with a capacity of 50 tons a day will also be built and will be the first hydrating plant in the Argentine. The new plant will be equipped with the most modern appliances for the economic production and handling of lime and hydrate.

Three cases, all dealing with freight rates on cement between North Alabama points, have been postponed from the December hearing of the Alabama Public Service Commission, to January 5.

The cement mills of the Birmingham district were operating on full time at the beginning of December and were finding a ready market at all times for their entire output, while the demand for cement was increasing along with the vast amount of concrete work being done in that locality.

The annual meeting of the Northwestern States Portland Cement Co. was held in December, resulting in the re-election of the following officers: C. H. McNider, president; A. F. Frudden, vice president; Hanford McNider, treasurer; F. G. Ray, Vinton, Ia., secretary.

The officers reported a satisfactory year in the industry, but are looking forward to an increase in business the next year, due in part to contemplated road building plans in the middle western states.

The Hill Clutch Machine & Foundry Co., Cleveland, Ohio, had a very interesting exhibit at the third National Exposition of Power and Mechanical Engineering held in New York City at the Grand Central Palace during the week beginning December 1. A. L. Whiteside, sales engineer of the New York office, was in charge.

The principal products featured were Smith type hill friction clutches, Cleveland type collar oiling bearings, Industrial type spur gear speed transformers and Steelarm automatic belt tighteners.

Sir Edwin Airey, former Mayor of Leeds, England, recently presented to New York State a photographic copy of the original patent granted to Joseph Aspdin by King George IV for the invention of portland cement. Dr. Frank P. Graves, State Commissioner of Education, received the gift.

The Wolverine Portland Cement Co. has declared a dividend payable December 15 to record of December 5. This makes a total of 16% paid for the year 1924. The company announces this year will be the largest both in production and shipments in its history.

The San Antonio Portland Cement Co., Cementville, recently awarded a contract for 10 concrete slurry tanks, 20 ft. diameter by 40 ft. high, to the R. C. Stone Engineering Co., Merchants Exchange, St. Louis, Mo.

W. W. Kuntz, formerly assistant general superintendent of the Atlas Portland Cement Co. at Northampton, Pa., has recently been appointed general superintendent in charge of operations of the mills and branches of the Mauser Milling Co., Laurys, Pa.

Two lots of European cement, approximately 2000 tons, recently arrived in Portland, Ore., on the Norwegian motorship George Washington, and the Scandinavian motorship, Lima. This will probably mark the delivery of the last parcels of that material from abroad this year.

Cement continues to move out in the Lehigh cement district in very large volume. Production is heavy as the storage houses at the various plants are empty. This district will probably have its banner year during 1924, from the viewpoint of production.

Cyrus Kuhns, veteran citizen of Egypt, Pa., who has nearly reached his 80th birthday, has retired from his work in the machine shop of the Giant Portland Cement Co.

A cement bag cleaning machine, invented by Carmine Talotta, of Cementon, Pa., is being successfully demonstrated in Cementon every Sunday and Monday and demonstrations will continue until January 26.

Roy B. James, of Bath, was almost instantly killed recently at the Bath plant of the Pennsylvania Cement Co., where he was employed as an electrician, when a cement carrier car that had become detached from its fastenings ran over him.

The stock of Foote Bros. Gear & Machine Co., was listed for the first time on the Chicago Stock Exchange on Thursday, December 18. Considerable activity developed and 3600 shares changed hands in the first days trading.

Foote Bros. Gear & Machine Co. has recently completed arrangements with the Thrall Electric Co. of Havana, Cuba, for the exclusive representation of IXL Gear Products and Speed Reducers in Cuba.

New Republic Pyrometers

The accompanying illustration shows one piece of equipment included in a complete line of indicating and recording pyrometers together with the usual thermocouple accessories recently exhibited for the first time by the Republic Flow Meters Co., Chicago, Ill., at the American International Steel Exposition, Boston, Mass. The designers of these Republic instruments have endeavored to incorporate features that have been requested by users of pyrometers.

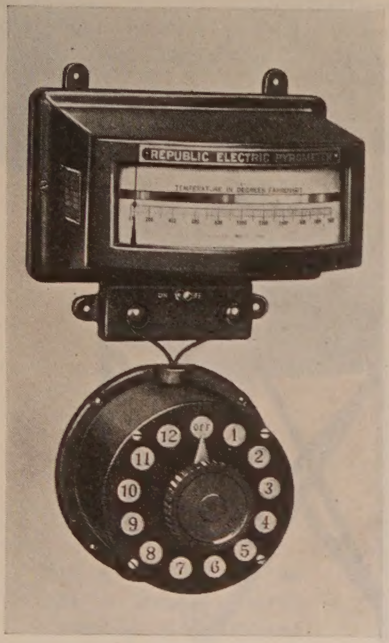


Fig. 1 —Republic wall type indicating pyrometer with Republic moisture proof 12-point rotary selective double pole switch

Among the features mentioned is the clock, having a complete time element with the usual escapement and with its own main spring which performs no other function than to release the operating energy periodically. Two independent charts are used instead of printing two scales on one piece of paper. A carbon ribbon is automatically advanced across the face of the chart and the instrument pointer moves freely between a depressor bar and the back of this ribbon.

A New Meter to Measure Coal

The accompanying illustration shows the Republic coal meter recently put out by the Republic Flow Meters Co., Chicago, Ill., and claimed to be the first instrument of this type which has ever been put on the market in this country.

The operation of the instrument depends on the automatic recording of the product of the cross sectional area and the velocity of the layer of coal passing into the furnace, the meter registering the volume of the coal burned. Various tests have been made which prove that if a number of equal volumes of any coal are weighed, the variation in weight of the samples is extremely small. By multiplying the revolutions of the counting wheel of the meter by a suitable constant, a highly accurate indication of the weight of coal burned is obtained.

Among the advantages claimed for the coal meter are, that it will give a means of checking coal consumption; eliminate errors due to moisture; can be accommodated to any type of chain grate stoker. It is inexpensive and easy to install and, requiring no attention, there are no upkeep costs.

It is further pointed out that in case of a boiler fitted with a steam meter, the pounds of steam per pounds of coal can be determined and therefore the boiler and furnace efficiency can be easily obtained.

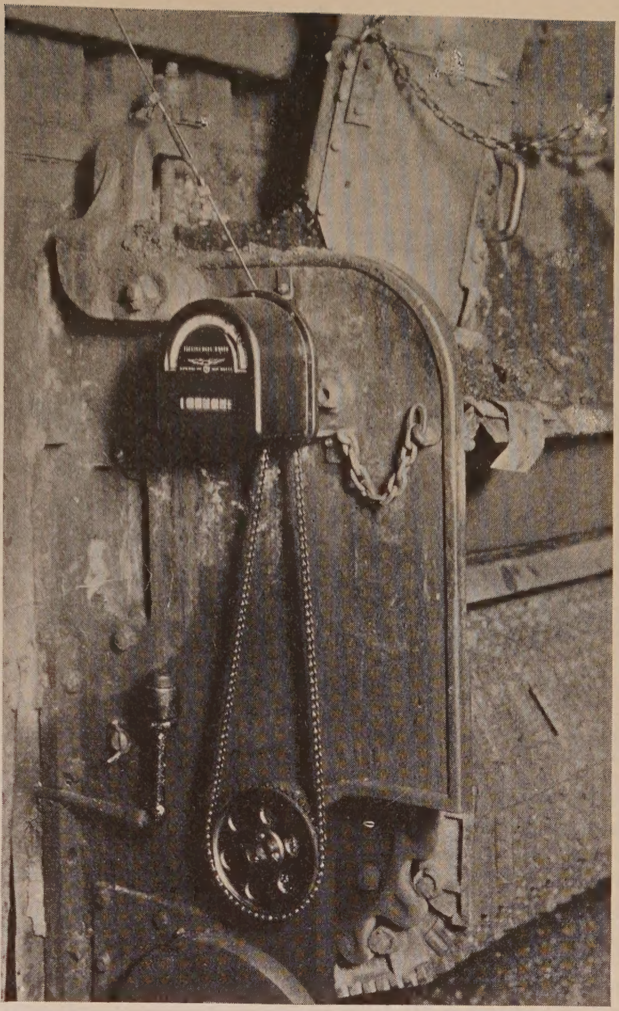


Fig. 1—Republic coal meter in operation

New Method for Making Gears

An interesting addition to the equipment used by the Foote Bros. Gear & Machine Co., is a machine for the grinding of spur gear teeth. The distortion during the heat-treating processes to which heat-treated cut spur gears are subject make it impossible to secure the absolute accuracy of tooth curves necessary for certain special gear applications, it is claimed.

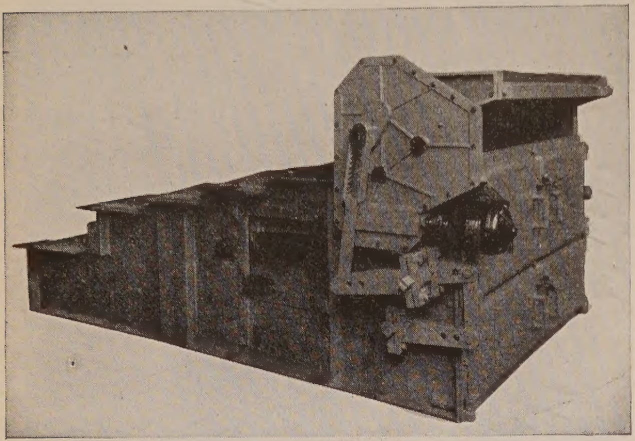
Under the new method, which has been in use in the automobile field, the gears are first given a rough cut with the generating or hobbing machine, allowing a large clearance. They are then subjected to the heat-treating and hardening process and are finished on the automatic gear tooth grinding machine.

The advantages claimed for spur gears finished on the gear tooth grinding machine are quietness in operation, elimination of vibration and back lash, greater efficiency, saving in power and longer life.

The Diamond Power Specialty Corp., Detroit, Mich., manufacturers of Diamond soot blowers for water tube and horizontal return tubular boilers, has appointed the Midwest Machinery Co., 104-106 So. Main Street, St. Louis, Mo., as its representative for the territory of Missouri, adjacent to St. Louis, south of and including Springfield and Decatur, Ill.

New Stoker

The new King Coal stoker shown in the accompanying illustration has recently been placed on the market by the Stoker Sales Co., 650 Old Colony Bldg., Chicago, Ill., designed to introduce coal screenings or any coal below the grade of No. 2 into a boiler, burn it smokelessly and then care for the ash element by discharging it into a receiving hopper. The distinguishing feature of this stoker is that it can be installed in any furnace up to 250 h. p. without expensive alterations and it is claimed by the manufacturers that it not only affords the convenience and cleanliness of an oil burner but results in a decided saving in fuel bills. Either natural or forced draft can be employed and the stoker is operated by either h. p. motor or hydraulic drive of equivalent power. There are only three moving parts throughout the entire mechanism. The King Coal stoker was designed by Joseph Harrington, who has devoted nearly a life time to research and development work on coal stokers.



Link-Belt Malleable Iron Safety Collar

It is estimated that 10% of the power generated in the average industrial plant is wasted between the generator and the consuming machine. Attention to this loss of power has given rise to changes in power transmission equipment and the development of more efficient mechanical means.

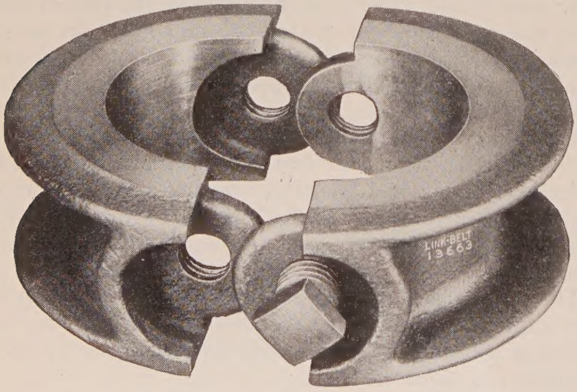


Fig. 1—New split safety collar

One of the most recent developments along this line comes from the Link-Belt Co. of Indianapolis—the device illustrated by the accompanying reproduction. This new safety collar is intended to maintain the proper alignment of such equipment as pulleys, shaft bearings, hangers, etc.

Great strength, toughness, durability, and light weight are all claimed for this new malleable iron safety collar, in addition to a new design which permits the collar to be split in two pieces, thus affording ready and economical installation or adjustment. This type of collar, however, is made also in the solid ring type, both types being accurately machine finished, assuring a tight fit and a pleasing appearance.

Industrial Electric Furnace Has New Features

A new industrial hearth-type electric furnace for operation up to 1850° F. has been recently perfected by the Westinghouse Electric and Manufacturing Co. These furnaces, which are known as type B, are made with hearth sizes ranging from 4 in. wide and 10¼ in. deep to 12 in. wide and 36 in. deep and are particularly designed for such operations as annealing, hardening, tempering, normalizing carbonizing, case hardening, vitreous enameling, and for laboratory work. Automatic temperature control makes it possible to duplicate heating conditions as often as is necessary and enables a predetermined manufacturing schedule to be carried out.

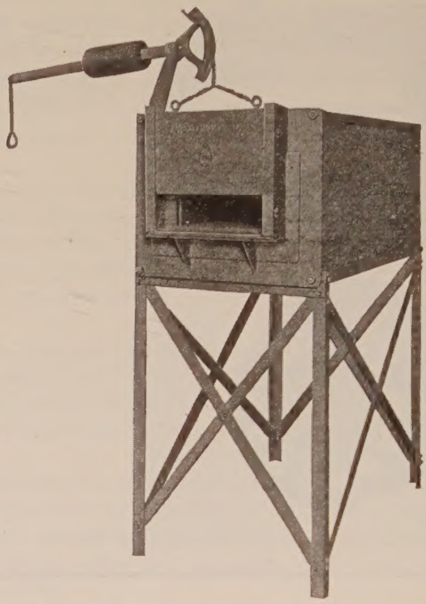


Fig. 1—Type B furnace showing chain suspended door

New Poole Reduction Gears

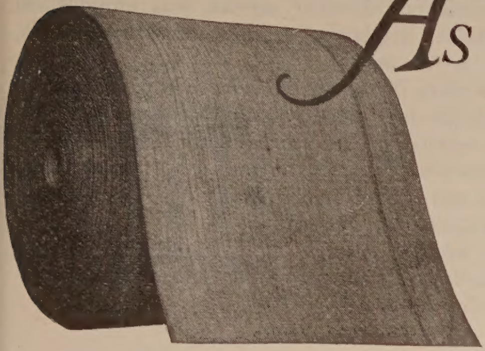
The Poole Engineering & Machine Co., Baltimore, Md., has recently brought out two new types of reduction gears known as type H and type K.

The type H reduction gear or speed transformer consists of a double helical or herringbone gear made of special analysis open hearth steel forging and a herringbone pinion cut integral with high speed shaft made of chrome vanadium steel. Both gear members are heat treated to proper hardness to minimize wear. Gear members are accurately ground and carefully tested for static balance before being assembled in gear casing.

Gears and pinions are totally enclosed in a cast iron horizontally split casing with bearing bosses integral with the top and bottom halves of casing. Casing joints are ground perfectly true to insure their being oil tight.

For low speed drives thorough lubrication is obtained by an improved splash and gravity system in which the gear dips in the oil sufficiently to carry oil to a reservoir in the upper casing from which it feeds to all bearings and directly between the gear teeth at the line of contact.

For turbine and other high speed drives, an oil pump and cooler is provided, thus insuring cool oil under pressure to the bearings and gear teeth.



AS *YOU KNOW*, practically all manufactured belting contains a cotton base, used to obtain tensile strength. Gandy originated, and has always built the best stitched cotton duck belt. This is a recognized fact; it is heavier, stronger, more pliable, better built in every way.

Now, with Gandy Belt available in the form of a high-temperature-resisting belt (called Thermo-Gandy), you have a belt that will resist both *wear and steam!*

This Gandy Belt is exactly like the Gandy Stitched Cotton Duck Belt, (red, with green edge) except that it is treated with a special solution of asphaltic oils. The result is a tough, pliable, long-wearing black belt that is unaffected by steam.

GANDY

The name "Gandy" is not a general term covering all Stitched Cotton Duck belt. It is the trade-marked name designating *only* the product of the Gandy Belting Com- of Baltimore, Maryland, who originated this type of belting in 1880.

TRADE MARK GANDY'S AMERICAN COTTON BELTING REG. U.S. PAT. OFF.

Standard Gandy Belts are made as follows: *Gandy Stitched Cotton Duck Belting*, for ordinary indoor work. *Thermo-Gandy* (pictured above), specially treated, for outdoor installations and extremes of heat, cold, steam, etc. *Gandy Wax-Impregnated Belt;* white washable, for conveying food products in bulk. *Plain White Gandy;* for conveying food products, where waxed belt is not necessary. *Gandy Endless Belts;* for tractors and all portable rigs.

THE GANDY BELTING COMPANY

GENERAL OFFICES AND PLANT

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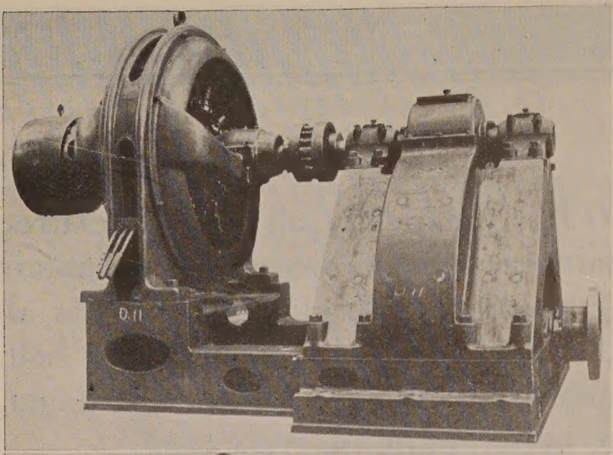
NEW YORK OFFICE
36 WARREN STREET

CHICAGO OFFICE
554 WEST ADAMS STREET



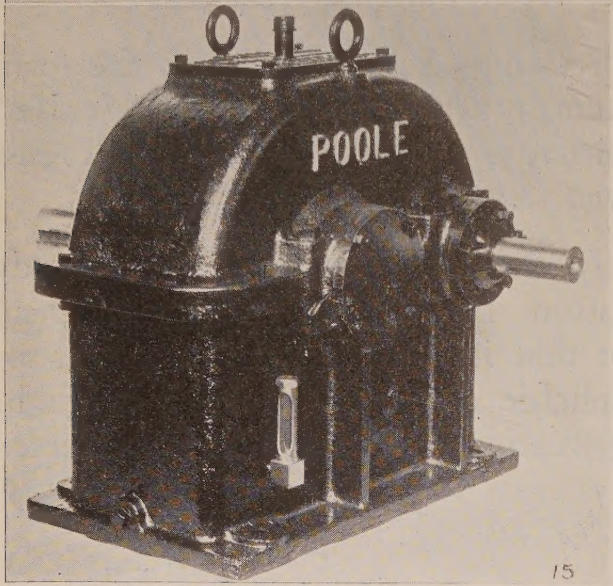


Fig. 1—Type K reduction gear
Fig. 2—Type H reduction gear

The type K reduction gear consists of double helical or herringbone forged steel pinion integral with shaft and a cast steel double helical spur gear. Both gear and pinion have cut stub teeth. The gear and pinion shafts are mounted in substantial babbitted bearings of the ring oiling type and the gear and pinion are lubricated by the splash system; the gear and pinion running in an oil tight oil filled case.

National Power Exposition

The number of new devices displayed at the Third National Exposition of Power and Mechanical Engineering is proof of the rapid advances in the arts and sciences of mechanical engineering. In general, the Exposition gave ample evidence that the critical power plant problems of refractories, condenser tubes, valves and fittings for high temperature work were on their way to a satisfactory solution. According to the managers of the Exposition, the first steps have been taken in the solution of these problems and the manufacturers are hard at work striving for a successful solution. The progress made in removing the guess work and the opinion from power plant operation was shown by the many new developments in metering, indicating and recording devices. Pulverized fuel equipment and oil burning apparatus showed improvements during the past year.

The largest portion of the exposition was devoted to combustion equipment. Water tube boilers, stokers, coal burning and pulverizing equipment, oil burning devices, superheaters and economizers, air preheaters, stud boilers, grates, forced draft apparatus and ash hoppers were exhibited. Some of the outstanding novelties mentioned in this connection were a four-tube section of the fin type furnace, an air preheater, a model of a pulverized fuel conveying system, first showing of two types of unit pulverizers, and a catenary curve cast iron coal bunker

The intensive problem of providing refractories for high temperature combustion chamber service was emphasized by the many exhibits displaying sections of furnace walls, arches and refractory materials.

Among the novelties in the instrument field were the line of flush front multiple draft gages, new temperature recorder for high pressure service, new indicating high resistance pyrometer, a new Venturi meter for steam, systems of visible valve control, recording and indicating CO_2 meter and a new meter to determine volume of coal burned.

The Exposition was managed by the International Exposition Co. with Charles F. Roth and Fred W. Payne, as managers, Grand Central Palace, New York City.

Trade Publications

Insulation in the Rock Products Industries, Cement—Lime—Gypsum is the title of a special bulletin B-20B, issued by the Celite Products Co., Chicago, Ill. In this bulletin is described the method of installing the Celite Products Co.'s new Sil-O-Cel rotary kiln brick in rotary lime and cement kilns. The bulletin also covers the burning of lime in shaft kilns as well as the use of insulation in the making of sand lime brick and in the calcining of gypsum. The bulletin is illustrated with reproductions of photographs and sketches showing the actual method of installing Sil-O-Cel insulation and kiln brick.

Measuring CO_2 Electrically is the title of catalog No. 2 issued by the Brown Instrument Co., Philadelphia, Pa., describing the Brown Electric CO_2 Recorder and Combined CO_2 and Flue Gas Temperature Recorder also the Brown Electric CO_2 Indicator and Combined Indicator for CO_2 and Flue Gas Temperature.

The principle of operation of the electric CO_2 meter is described and illustrated and answers to questions on electric CO_2 equipment are included.

A new 6-page pamphlet entitled *Two Feet of Electrical Heat* has been issued by the Cutler-Hammer Mfg. Co., Milwaukee, Wis. This pamphlet, publication H-2, illustrates and describes the C-H space heater and some of its many uses, such as keeping vaults warm and dry, in negative drying cabinets, in valve houses on fire sprinkler systems, in watchmen's towers, crane cabs, etc.

High Temperature Insulation. A lecture on the subject of heat transfer and high temperature insulation which was prepared by the Celite Products Co., Chicago, Ill., and was given before the engineering students of approximately 50 large universities in the country during 1923 and 1924, has been rewritten under the title of *"High Temperature Insulation."* Considerable of the same data is being used but this lecture contains a little more definite information on methods of determining heat flow through high temperature walls composed of various materials.

The lecture has been reprinted in booklet form by the Celite Products Co. there being 12 pages, 6 in. x 9 in. There are numerous illustrations showing the laying of insulating brick in the wall of a Stirling boiler, installing Sil-O-Cel powder in hot blast stove, installing insulating powder next to shell in a vertical lime kiln, rotary cement kiln being insulated with Sil-O-Cel, installing insulating brick on crown of brick kiln and installing 9-in. Sil-O-Cel brick in wall of oil-fired enameling furnace.

It is pointed out in conclusion that in designing equipment for all applications of heat in industrial processes, there are a great many factors as well as that of heat insulation to be taken into consideration, among them being temperature control equipment and the kind of fuel and refractories most suitable. Of these, the intelligent use of insulating materials is one of the most important factors contributing toward economical operation.

Catalog No. 31, Jones Power Transmission Machinery is the title of a new catalog, just issued by the W. A. Jones Foundry & Machine Co., Chicago, which covers shaft hangers, pillow blocks, couplings, collars, belt tighteners, mule stands, bench legs, etc. All items are well illustrated, listed, dimensioned, tabulated, etc—the very latest data on a completely rounded outline of quality transmission appliances.

Catalog No. 32, Jones Sprocket Wheels and Chain Belting is the title of a new illustrated catalog issued by the W. A. Jones Foundry & Machine Co., Chicago, describing a full line of sprocket wheels and chain belting, as well as chain tighteners, elevators, boots, buckets, bolts, hand wheels, etc. Complete specifications and price lists are given on all items shown.

WANTED—Draftsmen familiar with cement plant layout work and cement mill machinery. Apply by letter to Fuller-Lehigh Company, Box 35, Fullerton, Pa.